

The diagram illustrates algebra tiles for factoring. At the top, there are two sets of tiles: a red set for  $x^2$ ,  $x$ , and  $1$ , and a blue set for  $-x^2$ ,  $-x$ , and  $-1$ . Below this, a horizontal line separates the tiles from a factoring example. The example shows the expression  $3x^2 + 7x + 2$  being factored into  $(3x+1)(x+2)$ , with a note  $a \neq 1$ . The tiles are arranged in a grid to represent the product of these two binomials. The grid consists of three columns and two rows. The first column has three  $x^2$  tiles, the second column has seven  $x$  tiles, and the third column has two  $1$  tiles. The tiles are arranged in a way that shows the product of the two binomials.

### 3.8(4.4) Factoring Complex Trinomials ( $ax^2 + bx + c$ , $a \neq 1$ )

Expand  $(x + 4)(2x + 3)$ . What are the x-terms?

$$(x + 4)(2x + 3) = 2x^2 + 3x + 8x + 12$$

$$= 2x^2 + 11x + 12$$

To factor  $2x^2 + 11x + 12$ , we need to do these steps in reverse order.

How do the numbers 3 and 8 relate to 2, 11, and 12?

$$3 + 8 = 11$$

$$3 \times 8 = 2 \times 12$$

$$8 \times 3 = 24 \quad 3 \times 8 = 2 \times 12 = 24$$

$\Rightarrow$  Multiple the 1st and 3rd

Once you have broken the middle term, you can factor by grouping

$$= 2x^2 + 11x + 12$$

$$= 2x^2 + 3x + 8x + 12$$

$$= x(2x+3) + 4(2x+3)$$

$$= xa + 4a \quad \text{let } a = (2x+3)$$

$$= a(x+4)$$

$$= (2x+3)(x+4)$$

$$1^{\text{st}} \times 3^{\text{rd}} = 24$$

~~$1 \times 24$~~

~~$2 \times 12$~~

$3 \times 8$

~~$4 \times 6$~~

+  
make  
11

$$3 + 8 = 11$$

Ex. Factor  $6m^2 + 13m - 5$

Numbers multiply to: -30 (product)

Numbers add to: +13 (sum)

Numbers are:

15 and -2 (integers)

This technique is called SPI  
(sum, product, integers)

MAN

-30

~~$1 \times 30$~~

$2 \times 15$

~~$3 \times 10$~~

~~$5 \times 6$~~

$$15 + -2 = +13$$

Ex. Factor  $6m^2 + 13m - 5$

Numbers are:  $-2$  and  $15$

Now factor by grouping:

$$6m^2 + 13m - 5 =$$

$$= 6m^2 - 2m + 15m - 5$$

$$= 2m(3m-1) + 5(3m-1)$$

$$= (2m+5)(3m-1)$$

Ex. Factor:  $6x^2 - 13x + 6$

$$= 6x^2 - 4x - 9x + 6$$

$$= 2x(3x-2) - 3(3x-2)$$

$$= (3x-2)(2x-3)$$

$$\begin{array}{r} 36 \\ \hline \cancel{1 \times 36} \\ \cancel{2 \times 18} \\ \cancel{3 \times 12} \\ \boxed{4 \times 9} \end{array}$$
$$\begin{array}{r} -4 \\ + \\ -9 \end{array} = -13$$

Ex. Factor:  $10x^2 - 11x - 6$ 

$$= 10x^2 - 15x + 4x - 6$$

$$= 5x(2x-3) + 2(2x-3)$$

$$= (5x+2)(2x-3)$$

$$\underline{-60}$$

$$\cancel{1 \times 60}$$

$$\cancel{2 \times 30}$$

$$\boxed{4 \times 15}$$

$$\cancel{5 \times 12}$$

$$\cancel{6 \times 10}$$

$$\underline{-15} + \underline{4} = -11$$

Ex. Factor:  $4x^2 - 5xy - 6y^2$ 

$$= 4x^2 - 8xy + 3xy - 6y^2$$

$$= 4x(x-2y) + 3y(x-2y)$$

$$= (4x+3y)(x-2y)$$

$$\underline{-24}$$

$$\cancel{1 \times 24}$$

$$\cancel{2 \times 12}$$

$$\boxed{3 \times 8}$$

$$\cancel{4 \times 6}$$

$$\underline{-8} + \underline{3} = -5$$

Assigned Work:

p.223-224 #3bc, 5abc, 6,

#7abc, 11, 15, 17(Challenging)


 Look for common factors first!!!